



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/521,879

01/21/2005

Fabrice Pardo

37392

6163

116 7590 05/01/2007  
PEARNE & GORDON LLP  
1801 EAST 9TH STREET  
SUITE 1200  
CLEVELAND, OH 44114-3108

EXAMINER

INGHAM, JOHN C

ART UNIT

PAPER NUMBER

2814

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
--	-----------	---------------

3 MONTHS

05/01/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	Application No. 10/521,879	Applicant(s) PARDO ET AL.	
	Examiner John C. Ingham	Art Unit 2814	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 February 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 and 12-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 12-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 January 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. PCT/FR03/02343.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2/21/07</u> . | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. The amendments to the claim filed 21 February 2007 have been entered. The objection to the drawings has been withdrawn. The objection to claim 3 has been withdrawn. Claim 11 has been cancelled and the rejection under 35 USC 112 has been withdrawn.

#### ***Priority***

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. PCT/FR03/02343, filed on 24 July 2003.

#### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

Art Unit: 2814

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims **1-3, 9-10, and 12-15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Strittmatter (High-Frequency, Long Wavelength Resonant-Cavity-Enhanced InGaAs MSM Photodetectors) and Itatani (US 5,945,720).

6. Regarding claims **1-3, 9-10, and 12**, Strittmatter discloses in Fig 1 an MSM type photo-detection device (Introduction) designed to detect incident light and comprising reflecting means (DBR layer InGaAlAs:Fe/InAlAs:Fe) superposed on a first face of a support (substrate) to form a first mirror for a Fabry-pérot type resonant cavity (Introduction), a layer of material that does not absorb said light (InAlAs), an active layer (absorbing layer) made of a semiconducting material (InGaAs:Fe) absorbing incident light and a network of polarization electrodes (interdigitated Pt/Au electrodes) collecting the detected signal, the electrodes network being arranged on the active layer, the electrodes network being composed of parallel conducting stripes at a uniform spacing ( $1.0\mu\text{m}$ ), the electrodes network forming a second mirror for the resonant cavity (Introduction), wherein the light to be detected is incident to the device through the electrodes network (Fig 4 dashed line), the optical characteristics of this second mirror being determined by the geometric dimensions of said conducting strips, the distance separating the first mirror from the second mirror being determined to obtain a Fabry-perot type resonance (phase-matching, pg 146) for incident light between these two mirrors. Strittmatter does not specify that the period of the electrodes is less than the wavelength of incident light ( $1.31\mu\text{m}$ ). Instead, Strittmatter discloses a period of  $1.8\mu\text{m}$ .

Itatani teaches that the smaller the width of the window between electrodes, the faster the operating speed of a photodetecting device (col 1 ln 45-50). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Itatani in the device of Strittmatter in order to increase the speed of the photodetector.

7. Regarding claims **13 and 14**, Strittmatter discloses in Fig 1 the photo-detection device according to claim 1 wherein a passive layer of silicon nitride is deposited on the electrode network.

8. Regarding claim **15**, Strittmatter discloses the device of claim 1, but does not specify wherein a second face of the support has an electrode to apply an electrical field to the device the change the resonant wavelength of the resonant cavity by the opto-electric effect.

Itatani discloses in Fig 7 wherein the support of the Fabry-Perot resonator structure has an additional control electrode (12) that allows the optical properties (absorption coefficient, refractive index) to be varied (col 10 ln 32-40). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Itatani on the device of Strittmatter in order to allow control of optical properties. Placement of the extra electrode on the top or bottom face of the support substrate would be an obvious design choice.

9. Claims **4-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Strittmatter, Itatani and Brown (US 5,663,639). Strittmatter and Itatani disclose the photo-detection device according to claim 1, but fail to specify wherein the reflecting

Art Unit: 2814

means forming a first mirror are composed of a silver, gold, or aluminum layer, or a multilayer dielectric. Instead Strittmatter discloses a Bragg mirror (DBR) of AIAs and AlGaAs.

Brown teaches in Fig 4 that a metallization layer (17) of gold may be used as a bottom reflecting layer in order to improve reflect photons and serve as a heat sink (col 7 ln 30-37). Brown also teaches in Fig 5 that instead of the metallic layer, a multilayer dielectric mirror (202) of AIAs and AlGaAs may be used, also to reflect photons and improve the conversion efficiency (col 7 ln 49-53). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Brown on the device of Strittmatter and Itatani in order to improve the conversion efficiency of the photo-detection device.

10. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Strittmatter and Henning (US 6,528,827). Strittmatter and Itatani disclose the photo-detection device of claim 1, but fail to specify wherein the layer of material that does not absorb light is made of  $\text{Al}_x\text{Ga}_{1-x}\text{As}$ , wherein  $x$  is of the order of 0.35, and the active layer is made of GaAs.

Henning teaches in Fig 6 that GaAs is typically used for active layers (104) to absorb light (col 4 ln 33), and layers of AlGaAs (106) with aluminum concentrations around 0.3 (col ln 4 ln 32) are used as transparent wide band-gap layers (col 2 ln 20-24) and buffers between high concentration layers and absorption layers (col 4 ln 33). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Henning on the device of Strittmatter and Itatani, providing a

conventional GaAs absorbing (active) layer and a transparent wide band-gap layer of AlGaAs, functioning as a buffer between the DBR and absorbing layer while at the same time remaining transparent to light.

### ***Response to Arguments***

11. Applicant's arguments, see page 6, filed 21 February 2007, with respect to the rejection(s) of claim(s) 1 under 35 USC 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Strittmatter and Itatani.

12. Applicant's arguments filed 21 February 2007 have been fully considered but they are not persuasive. Regarding the argument that Strittmatter does not teach wherein the light to be detected is incident to the device through the electrodes network, Strittmatter shows in Fig 4 that the light may come through the electrode network and the top mirror may be left off of the device.

### ***Conclusion***

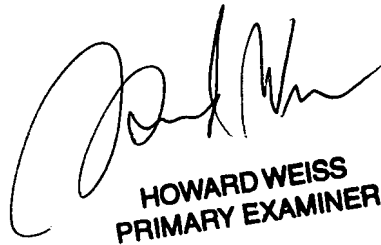
Any inquiry concerning this communication or earlier communications from the examiner should be directed to John C. Ingham whose telephone number is (571) 272-8793. The examiner can normally be reached on M-F, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

John C Ingham  
Examiner  
Art Unit 2814

jci



HOWARD WEISS  
PRIMARY EXAMINER